

Norfolk Island Green Parrot *Cyanoramphus novaezelandiae cookii*

Key Findings

The Norfolk Island Green Parrot was reduced to fewer than 50 individuals by the 1970s following extensive clearing of trees and introduction of feral predators on the island. While land clearing has ceased, competition for suitable nesting sites with introduced species such as rosellas and common starlings is fierce, and predation from rats and cats remains a current threat. Recovery activities have included maintaining predator-proof nest sites, restoring habitat and controlling rats, cats and rosellas. The Green Parrot has responded well to these efforts, even expanding beyond the borders of the Norfolk Island National Park to which its range had contracted. Photo Cassandra Jones



Significant trajectory change from 2005-15 to 2015-18?

Yes, was declining and now increasing.

Priority future actions

- Maintain and monitor predator proof nests, and provide these outside the National Park
- Eradication of rats and cats on the main island, or at least intensively managed to low levels

Full assessment information

Background information

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The primary purpose of this scorecard is to assess progress against achieving the year three targets outlined in the Australian Government's Threatened Species Strategy, including estimating the change in population trajectory of 20 bird species. It has been prepared by experts from the **National Environmental Science Program's Threatened Species Recovery Hub**, with input from a number of taxon experts, a range of stakeholders and staff from the Office of the Threatened Species Commissioner, for the information of the Australian Government and is non-statutory. It has been informed by statutory planning documents that guide recovery of the species, such as Recovery Plans and/or Conservation Advices (see Section 11). The descriptive information in this scorecard is drawn from Ortiz-Catedral et al. (2018) unless otherwise noted by additional citations.

The background information aims to provide context for estimation of progress in research and management (Section 7) and estimation of population size and trajectories (Section 8).

1. Conservation status and taxonomy

Conservation status	2018
IUCN	Critically Endangered
EPBC	Endangered

Taxonomy:

Species is Least Concern. *C. n. erythrotis* (Macquarie Island) and *C. n. subflavescens* (Lord Howe Island) are Extinct.

2. Conservation history and prospects

The Norfolk Island Green Parrot, which is endemic to the island, has been subject to two recent waves of decline, near extinction, and managed recovery. The first decline and near extinction happened as result of early loss of habitat after settlement, combined with predation and competition from introduced species, particularly rats after the Second World War (Hicks & Greenwood 1989; Hill 2002). Following predator control and nest-protection, the green parrots recovered. However, the population declined again between 2007 and 2013, during a period when active management was abandoned. Fortunately, in 2014, emergency intervention including the predator proofing of suitable nesting sites has allowed the population to recover a second time (Ortiz-Catedral et al. 2018).

3. Past and current trends

The Norfolk Island Green Parrot was a common forest bird when Norfolk Island was discovered in the late 1700s, however, fewer than 50 individuals remained by the late 1970s. In 1983, the Government Conservator commenced a captive breeding program which was followed by sustained rat and cat control, as well as artificial nest construction (Hicks and Greenwood 1989). Over 15 years, between 1987 and 2002, approximately 250 chicks fledged successfully and sightings became common. However, following a period of no active management between 2007 and 2013, a survey found the population had declined to between 42 and 96 individuals, of which only 10 were confirmed adult females (Ortiz-Catedral et al. 2018). During the course of 2014, 78 rat and cat-proof nests were erected and rat and cat control intensified nearby. Nest success was 70% by the 2016 breeding season, up from less than 40% and the number of individuals had increased to approximately 400. While the 460 hectare rainforest remnants of the Mt Pitt section of Norfolk Island National Park remains a stronghold for the species, there is growing anecdotal evidence that its range has increased substantially, and green parrots are now regularly seen in areas well outside of the park boundary (M. Wilson pers.comm.).

Monitoring (existing programs):

The population was monitored in 2013 and 2016 by Massey University. Predator proof nest sites have been monitored by NINP staff as part of business as usual since 2015. Research projects have been undertaken by Massey University staff on the prevalence of beak and feather disease on Norfolk Island, seasonal variability of food, and morphological differences in males and females.

Population trends:

Tables 1 and 2 summarise the overall trend and status of the Norfolk Island Green Parrot. The information provided in these tables is derived from Ortiz-Catedral et al. (2018), with some amendments made by contributing experts based on new information.

Table 1. Summary of the available information on Norfolk Island Green Parrot distribution and population size, and (where possible) trend estimates between 2015 and 2018 for each parameter.

Population parameters	Published baseline	2015 Estimate	2018 Estimate	Confidence in estimates
Extent of Occurrence	35 km ²	35 km ²	35 km ²	High
Area of Occupancy	8 km ²	4.6km ²	25 km ²	High
Dates of records and methods used	As per Bird Action Plan	Visual and aural sampling, distance sampling and general observations	Visual and aural sampling, distance sampling and general observations (Unpublished data 2016, 2017)	n/a
No. mature individuals	250	144-220*	250-450	High
Any other measure of relative abundance (specify)			Fledging success from predator proof nest sites: 2016: 80 fledglings recruited, 2017: 41	
No. of subpopulations	1	1	1	High
No. of locations	1	2	2	High
Generation time	3.1	n/a	n/a	High. Derived from latest global analysis by BirdLife International

*May include some juveniles.

Table 2. Estimated recent (2005-2015) and current (2015-2018) population trend for the Norfolk Island Green Parrot.

Sub-population	Estimated % of population	2005-2015 trend	Confidence in 2005-2015 trend	2015-2018 trend	Confidence in 2015-2018 trend	Details
Whole population	100		High		High	Reversal of pre-2015 trend began in 2014 after erection of new predator-proof nest boxes

KEY:

Improving	Stable	Deteriorating	Unknown
			

Confidence	Description
High	Trend documented
Medium	Trend considered likely based on documentation
Low	Trend suspected but evidence indirect or equivocal

4. Key threats

The threats listed here are derived from the Ortiz-Catedral et al. (2018), with some amendments from contributing experts based on new information. Note that this is not a list of all plausible threats, but a subset of the threats that are likely to have the largest impact on populations.

Farming and forestry

Extensive clearance of vegetation for agriculture and felling of large trees destroyed most suitable nest sites on Norfolk Island, making competition for remaining sites intense. Thus, although the land clearance has stopped, the legacy continues to have a major impact on the parrots' prospects (Garnett et al. 2011).

Nest competitors, particularly Crimson Rosella *Platycercus elegans*

Crimson Rosellas, and to a less extent Common Starlings (*Sturnus vulgaris*) and sometimes feral bees (*Apis mellifera*), all compete for scarce hollows. All are introduced to Norfolk Island. Crimson Rosellas sometimes expel established parrot pairs from hollows. Common Starlings and bees fill hollows with material that render them unsuitable for nesting (Hill 2002).

Guava

Red guava (*Psidium* spp.) provides fruit that support a large rat population (R. Clarke pers.comm.) though the plant also provides food for the parrot.

Black rats (*Rattus rattus*)

Predation by black rats is the greatest threat to Norfolk Island Green Parrots as they prey upon eggs, nestlings and brooding females. It has been identified as the cause of clutch failure in a large proportion of Norfolk Island Green Parrot nests (Ortiz-Catedral et al. 2018).

Feral cats (*Felis catus*)

Cats primarily prey on fledglings and adults. Juveniles are at highest risk of predation immediately after fledging and when they begin to forage independently. Brooding females are typically susceptible to predation by cats (Ortiz-Catedral et al. 2018).

The impacts of the major threats are summarised in Table 3.

Table 3. The major threats facing the Norfolk Island Green Parrot and their associated impact scores.

CURRENT THREAT IMPACT			
Threat	Timing	Extent	Severity
1. Farming and forestry	Continuing/ongoing	>90% of range	Negligible declines (<1%)
2. Nest competitors, particularly Crimson Rosella <i>Platycercus elegans</i>	Continuing/ongoing	>90% of range	Negligible declines (<1%)
3. Guava <i>Psidium guajava</i>	Continuing/ongoing	50-90% of range	Negligible declines (<1%)
4. Black rat <i>Rattus rattus</i>	Continuing/ongoing	>90% of range	Negligible declines (<1%)
5. Feral/domestic cat <i>Felis catus</i>	Continuing/ongoing	>90% of range	Negligible declines (<1%)

Timing: continuing/ongoing; near future: any occurrence probable within one generation (includes former threat no longer causing impact but could readily recur); distant future: any occurrence likely to be further than one generation into the future (includes former threat no longer causing impact and unlikely to recur).

Extent: <1% of range; 1-50%; 50-90%; >90%.

Severity: (within three generations or 10 years, whichever is longer) Causing no decline; Negligible declines (<1%); Not negligible but <20%; 20-29%; 30-49%; 50-100%; Causing/could cause order of magnitude fluctuations.

5. Past and current management

Recent and current management actions thought to have contributed to the conservation of Norfolk Island Green Parrots are summarised in Table 4. This information is a collation of material provided by experts. As the range of the parrot has increased substantially over the last three years, management action in the park now directly affects a smaller proportion of the population than it did at the start.

A regional Recovery Plan (2010) and Conservation Advice (2016) are in place, guiding recovery action (see Section 11).

Table 4. Management actions thought to have contributed to the conservation of the Norfolk Island Green Parrot.

Action	Location	Timing	Est. % pop'n	Contributors and partners
Maintenance of 67 predator-proof nest sites	NINP	2015-2018 (ongoing)	75	Parks Australia
Feral cat control: 165 cats captured over 3 years.	NINP	2015-2018 (ongoing)	75	Parks Australia
Rodent Control: an initial network of 900 stations was expanded to 1800 stations covering a larger area as a result of funding from OTSC. The funding also enabled the whole 1800 stations to be baited for a period of approximately 12 months. Since the funding ceased, the full 1800 station network is still used, but each station is only baited once every two months	NINP	2015-2018 (ongoing with a short-term increase in effort 2015-17)	75	Parks Australia / Contractor, with a funding contribution from the Department of Environment and Energy
Feral bird control: 882 crimson rosellas culled over 3 years	NINP	2015-2018 (ongoing)	75	Parks Australia
Habitat rehabilitation and weed control program to improve habitat quality and extent on Norfolk Island	NINP	2015-2018 (ongoing)	75	Parks Australia
Translocation of parrots to Phillip Island (unsuccessful)	Phillip Island	2017		Parks Australia, Green Parrot Advisory Panel and BirdLife Australia. Funding from the Dept of Environment and Energy and other sources (including from crowd-sourced funding campaign)

6. Actions undertaken or supported by the Australian Government resulting from inclusion in the Threatened Species Strategy

The activities tabled above have been supported by the Australian Government (through Parks Australia and the Department of the Environment and Energy) and support the Strategy. This includes direct investment of approximately \$700,000 in actions aimed at supporting the recovery of the Norfolk Island Green Parrot, including:

- \$300,000 towards rodent control (establishment of additional rat baiting stations to bring the total number of stations to 1800, doubling the size of the previous network).
- \$300,000 towards translocation of Norfolk Island Green Parrots to Phillip Island and for a review to improve the probability of success of a possible future attempt.
- \$110,000 to manage feral cats across the National Park, council reserves and private property using leg hold traps and cage traps. The project also includes a Responsible Pet Ownership program with the local community. This project began in late 2018 with a camera survey, with cat control actions to commence in 2019.

7. Measuring progress towards conservation

Table 5. Progress towards management understanding and management implementation for each of the major threats affecting the Norfolk Island Green Parrot in 2015 (i.e. timing of TSS implementation) and 2018, using the progress framework developed by Garnett et al. 2018.

PROGRESS IN MANAGING THREATS			
Threat	Year	Understanding of how to manage threat	Extent to which threat being managed
1. Farming and forestry	2015	6. Research complete and being applied OR ongoing research associated with adaptive management of threat	4. Solutions are enabling achievement but only with continued conservation intervention
	2018	6. Research complete and being applied OR ongoing research associated with adaptive management of threat	4. Solutions are enabling achievement but only with continued conservation intervention
2. Nest competitors, particularly Crimson Rosella	2015	6. Research complete and being applied OR ongoing research associated with adaptive management of threat	4. Solutions are enabling achievement but only with continued conservation intervention
	2018	6. Research complete and being applied OR ongoing research associated with adaptive management of threat	4. Solutions are enabling achievement but only with continued conservation intervention
3. Guava <i>Psidium guajava</i>	2015	5. Trial management is providing clear evidence that it can deliver objectives	2. Work has been initiated to roll out solutions where threat applies across the taxon's range
	2018	6. Research complete and being applied OR ongoing research associated with adaptive management of threat	4. Solutions are enabling achievement but only with continued conservation intervention
4. Black rat <i>Rattus rattus</i>	2015	6. Research complete and being applied OR ongoing research associated with adaptive management of threat	4. Solutions are enabling achievement but only with continued conservation intervention
	2018	6. Research complete and being applied OR ongoing research associated with adaptive management of threat	4. Solutions are enabling achievement but only with continued conservation intervention
5. Feral/domestic cat <i>Felis catus</i>	2015	5. Trial management is providing clear evidence that it can deliver objectives	4. Solutions are enabling achievement but only with continued conservation intervention
	2018	6. Research complete and being applied OR ongoing research associated with adaptive management of threat	4. Solutions are enabling achievement but only with continued conservation intervention

> Green shading indicates an improvement in our understanding or management of threats between years 2015 and 2018, while red shading indicates deterioration in our understanding or management of threats.

KEY

Score	Understanding of how to manage threat	Extent to which threat is being managed
0	No knowledge and no research	No management
1	Research being undertaken or completed but limited understanding on how to manage threat	Management limited to trials
2	Research has provided strong direction on how to manage threat	Work has been initiated to roll out solutions where threat applies across the taxon's range
3	Solutions being trialled but work only initiated recently	Solutions have been adopted but too early to demonstrate success
4	Trial management under way but not yet clear evidence that it can deliver objectives	Solutions are enabling achievement but only with continued conservation intervention
5	Trial management is providing clear evidence that it can deliver objectives	Good evidence available that solutions are enabling achievement with little or no conservation intervention
6	Research complete and being applied OR ongoing research associated with adaptive management of threat	The threat no longer needs management

8. Expert elicitation for population trends

An expert elicitation process was undertaken to assess population trends for the period 2005-2015 and post-2015 under the following management scenarios. Please note that differences between Management Scenarios 2 and 3 (Fig. 1) are difficult to attribute, as it can be difficult to determine whether actions undertaken after 2015 were influenced by the Threatened Species Strategy or were independent of it (see Summary Report for details of methods).

Management Scenario 1 (red line): *no conservation management undertaken since 2015, and no new actions implemented.*

- Nest sites are no longer maintained
- Rat baiting and rosella control ends

Under this scenario remaining nest hollows are gradually rendered unsuitable, are regularly raided by rats or occupied by crimson rosellas

Management Scenario 2 (blue line): *continuation of existing conservation management (i.e. actions undertaken before implementation of the Threatened Species Strategy or independent of the Threatened Species Strategy).*

- Nest sites are maintained
- 900 stations a month are baited for rats
- Some ongoing control of weeds and cats

Under this scenario nesting continues to be successful and baiting may keep rats under control but potentially not at an intensity that will maintain breeding success

Management Scenario 3 (green line): *continuation of existing management, augmented by support mobilised by the Australian Government under the Threatened Species Strategy.*

- An additional 900 bait stations were operated from 2015 to 2017

Under this scenario baiting is sufficient to maintain breeding success, especially when combined with nest site maintenance.

Overall estimated population trajectories subject to management scenarios considered

The Norfolk Island Green Parrot is currently being managed under Scenario 3 (green line). The Australian Government Threatened Species Strategy funding has ended so business as usual rat baiting and nest site maintenance is continuing.

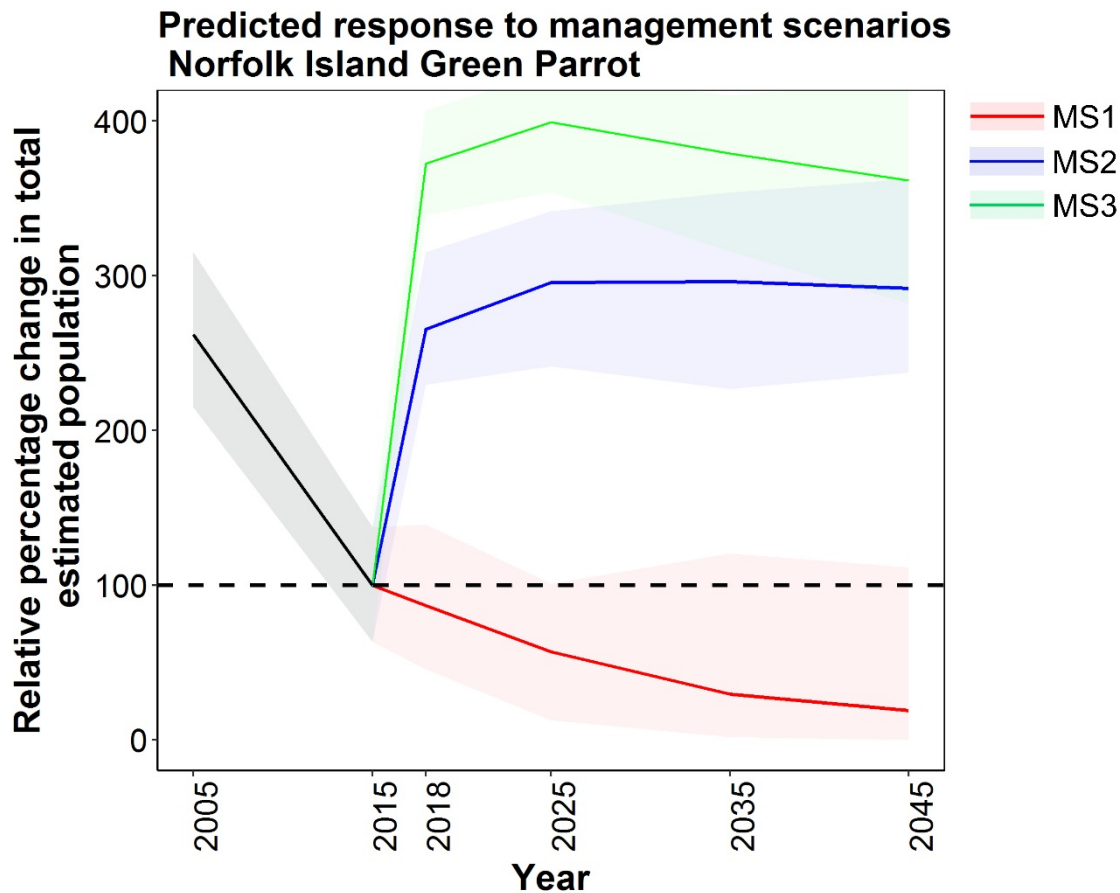


Figure 1. Estimated relative percentage change in population under each of the management scenarios described above. Data derived from 7 expert assessments of Norfolk Island Green Parrot expected response to management, using four-step elicitation and the IDEA protocol (Hemming et al. 2017), where experts are asked to provide best estimates, lowest and highest plausible estimates, and an associated level of confidence. The dashed line represents the baseline value (i.e. as at 2015, standardised to 100). Values above this line indicate a relative increase in population size, while values below this line indicate a relative decrease in population size. Shading indicates confidence bounds (i.e. the lowest and highest plausible estimates).

Population size projections based on expert elicitation are extended here to 2025, 2035 and 2045 (i.e. 10, 20 and 30 years after the establishment of the Threatened Species Strategy) on the grounds that some priority conservation management actions may take many years to achieve substantial conservation outcomes. However, we note also that there will be greater uncertainty around estimates of population size into the more distant future because, for example, novel threats may affect the species, managers may develop new and more efficient conservation options, and the impacts of climate change may be challenging to predict.

Improved trajectory (Threatened Species Strategy Year 3 target):

The primary purpose of this scorecard is to assess progress against achieving the year three targets outlined in the Australian Government's Threatened Species Strategy, i.e. a demonstrated improved trajectory for at least half of the priority species (10 birds and 10 mammals). To assess this, we first use the expert-derived trend between 2005-15 (i.e. 10 years prior to implementation of the TSS) as a baseline for assessing whether there has been an improvement in trajectory in the time since implementation of the TSS (i.e. 2015-18). Table 6 below summarises this information, where negative values indicate a declining population, and positive values indicate an increasing population. We used Wilcoxon match-paired tests to compare trajectories for these two periods; a significant result (probability <0.05) indicates that there was a high concordance amongst experts that their trajectory estimates for 2005-15 were different to their estimates for 2015-18.

Table 6. A comparison of the relative annual percentage population change for the periods 2005-2015 and 2015-2018.

	Pre-TSS trend (2005-2015)	Post-TSS trend (2015-2018)	Year 3 target met?	Significant concordance among elicitors?
Annual percentage population change	-16.2	90.8		The trajectory has markedly improved. Concordance among elicitors was significant.

Additional actions that could improve trajectory

The potential impact of carrying out specific additional conservation measures on the population trajectory of the NI Green Parrot was also evaluated through expert elicitation. Current management includes maintainign nestboxes, poison-baiting for feral rats, some weed and cat control. Additional actions that could further improve the population trajectory include:

- Parrots are successfully reintroduced to Phillip Island
- Predator-proof nest sites are provided outside the National Park
- Eradication of rats and cats is eventually achieved on the main island itself, or if unlikely to be feasible, rats and cats managed to low levels.

With these actions, a secure population would be established free from predators before Norfolk Island is itself freed from feral mammalian predators.

9. Immediate priorities from 2019

The priorities listed here are derived from Ortiz-Catedral et al. (2018) with some amendments made by contributing experts based on new information. Identification of these priorities in this document is for information and is non-statutory. For statutory conservation planning documents, such as Recovery Plans or Conservation Advices, please see Section 11.

Data collection:

- Monitor the population regularly, ideally collecting both population-level and individual-level data
- Monitor nest success
- Determine an optimal rodent and cat control strategy

Management actions:

- Maintain and monitor predator proof nest sites.
- Continue rodent control
- Continue cat control.
- Community engagement as the parrots disperse over a large proportion of the island
- Act on the recommendations of the review of the translocation attempt in 2017

10. Contributors

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11. Legislative documents

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